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Museum a special packet enclosed in No. 343 is labeled *Acrolejeunea torulosa*, the name under which Spruce distributed the species in his exsiccatæ. This special packet, in the writer's opinion, likewise contains nothing but *Brachiolejeunea corticalis*. If this determination is accepted there remain no North American records for *P. torulosus*, and the only member of the genus definitely known from north of Panama is *P. polycarpus* (Nees) Trevis., recently described and figured by the writer.[1]

[1] Bull. Torrey Club **35**: 162. *pl. 7, f. 1–11.* 1908.

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NOTES ON NORTH AMERICAN SPHAGNUM, III

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The Subgenus Inophloea Russow (concluded)

The four species previously treated stand out very definitely and may be considered as taxonomically conclusive; the remaining species of the subgenus are much less understood in their relations on the one hand to *S. palustre*, on the other to each other, as the extensive synonymy of comparatively recent date will readily show. Their foremost common characteristic is found in the chlorophyll cells of the branch leaves, which with a central lumen are usually equally exposed on both surfaces or on neither; there is rarely a greater or exclusive exposure on the inner surface, but the section with the characteristic central lumen shows where the plant belongs. For the rest there is a notable tendency to a reduction of pores in the outer walls of the cortical cells of the stem, in which point as in other minor particulars the remaining species of our group show a somewhat closer relationship to *Litophloea*.

5. *Sphagnum papillosum* Lindberg, 1872. This species is in typical specimens recognizable by the papillose inner walls of its hyaline leaf cells, the papillæ being of course confined to the part of the wall immediately overlying the chlorophyll cells. If one is using high magnification with good light, he will note the papillæ on viewing the inner surface of the leaf; they are also in evidence in a transverse section, but can be best observed in a longitudinal one. The chlorophyll cells themselves are normally more or less barrel-shaped in section, usually exposed on both surfaces, and have a central elliptical lumen and thick walls. The most essential features of the species were all well brought out by Lindberg in the original short diagnosis.[1] Others were noted by Russow:[2] the cortical cells of the stem have their fibrils much reduced or almost entirely lacking, the fewer pores (especially often 2) of the outer cortical cells are small, usually round and very clearly defined, as is shown in Braithwaite's plate,[3] the stem leaves are relatively broad in comparison to their length and

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[1] Contributio ad floram cryptogamam Asiæ boreali-orientalis 280. 1872.

[2] Zur Kenntn. d. Subsec. u. Cymbif. Gruppe europ. Torfm. 117 ff. 1894.

[3] Sphagnaceæ of Europe and North America *pl. IV, fig. 9c.*

show more frequently a division of some of their hyaline cells; the branch leaves, besides the essential differences mentioned above, have in their broad hyaline cells more numerous and stronger fibrils and generally less pores on the outer surface, the latter from their occurrence in adjacent cell angles giving the impression of a disposal in pairs or threes. All these characters, which are shared by the following species (no. 6), are somewhat variable, so that they do not in any case give sharp diagnostic distinctions, but they are of value as demonstrating cumulatively the really considerable deviation of this and the next species from the others of the group.

The identification of *S. Waghornei* Warnst., 1894, with this species is the result of the examination of two specimens of type material (New Harbor, Newfoundland, 22-5-93) in the herbarium of the New York Botanical Garden. Warnstorf seems himself to have made a similar discovery, for he says in his most recent work[1] that the plant occurred among *S. papillosum* and was used up, apart from a few fragments, in the investigation. That Warnstorf may have failed to note papillæ in his original examination is by no means incredible; that on the other hand a plant or two of *S. palustre* was mixed with his original specimen is not wholly impossible. What there is of his brief description would agree rather better with the latter species. There is no feature in the description nor anything in the plant's habitat to even remotely suggest a separate species.

The species is one of characteristically northern propensities, occurring in Europe and Asia as well as in North America. On the latter continent its range is a fairly definite one, extending from Labrador to New Jersey on the eastern coast, from Vancouver Island to Alaska on the western. Within this area it may be sought in robust, strongly pigmented, brown to nearly black, dull rather than glossy specimens of the *Inophloea* type.

6. *Sphagnum erythrocalyx* Hampe, 1848. This South American species has not previously been accredited to North America, as, generally speaking, the mosses of the two continents seem to have been insufficiently correlated. The first recognition of this as a form distinct among those of North America was by Cardot,[2] who gave an admirable diagnosis of it, apart from the chlorophyll cell section, as *S. cymbifolium* var. *ludovicianum* Renauld & Cardot, even calling attention to its close correspondence with the description of the South American *S. erythrocalyx*. Warnstorf saw that the form was specifically distinct from *S. cymbifolium* (*S. palustre*) and raised it to specific rank as *S. ludovicianum* (R. & C.) Warnst.,[3] where it has, apart from synonyms, remained undisturbed since. My identification of it with *S. erythrocalyx* rests upon a comparison with the type of this species, which I was enabled to see through the kindness of Mrs. Britton and Mr. A. Gepp.

The species differs little from the preceding one, so that Russow was inclined to doubt its claim to specific rank.[1] It is, with rare exceptions, a less robust plant; the pigmentation is distinctly reddish brown; the cortical cells of stem (and sometimes of branches) are likely to be even less fibrillose than in *S. papillosum* and show frequently only a single rather large pore per cell; the stem leaves tend to be dimorphous, as Cardot noted, the hemiisophyllous ones very large and fibrillose throughout, sometimes with considerably divided hyaline cells, the others unusually short and small for this group. The branch leaves are frequently broadly rounded at apex, less strongly cucullate than usual in the group, and with correspondingly less resorption of outer membrane in cells near apex of leaf; the chlorophyll cells with thinner walls are often quite rectangular in section, but vary to lenticular, being nearly always exposed on both surfaces. The inner walls of the hyaline cells where overlying these are generally smooth in North American specimens; in Brazil the same or a very closely related species shows papillæ and similar forms may occur with us. I take these to be distinct from *S. papillosum.*

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[1] Engler, Pflanzenreich **51**: 469. 1911.

[2] Révision des Sphaignes de l'Amérique du Nord 4. 1887.

[3] Hedwigia **30**: 161. 1891.

Of the considerable synonymy of the species, which will be greatly increased by South American names, it should be said at the start that Warnstorf's conception of *S. erythrocalyx* has undergone notable fluctuations, due largely to the fact that he had not seen type material until recently.[2] In 1890, e. g., he made it a synonym of *S. medium* Limpricht, as a variety *papillosum* with papillose inner walls of the hyaline leaf cells,[3] only to change his opinion the next year,[4] though it was still based upon specimens collected by Glaziou, not the type collected by Beyrich. In 1911,[5] having in the meantime seen type material of *S. erythrocalyx*, he separates from it *S. perichaetiale* Hampe, which he had in 1891 made its synonym, but without in either case having seen the type of *S. perichaetiale*, which was also collected by Beyrich in the same locality as *S. erythrocalyx.* I have been enabled to compare the types of both species but can detect no appreciable difference. The name, *S. perichaetiale*, was apparently suggested by the fact that the plant bore immature capsules immersed within perichaetial leaves.

S. guadalupense Schimper, 1876, from the West Indian island of Guadeloupe is still consistently retained by Warnstorf[6] as a separate species, but I am unable to see any essential difference in the Guadeloupe specimens, other than their slightly smaller size, a feature characteristic of *Sphagnum* (except *S. portoricense*) from that island. *S. Husnoti* Schimper, 1876, from the same place was reduced to synonymy with *S. guadalupense* by Warnstorf in 1891[7]—it differs only in its paler color and weaker growth,—as was also *S. Guyoni* Warnstorf, 1884, from

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[1] Zur Kenntn. d. Subs. u. Cymbif. Gruppe europ. Torfm. 120. 1894; *cf.* also Cardot, Rév. 5. 1887.

[2] *Cf.* Pflanzenreich **51:** 516. 1911.

[3] Bot. Gaz. **15:** 252f, and almost simultaneously Hedwigia **29:** 186. 1890.

[4] Hedwigia **30:** 156–158. 1891.

[5] L. c. 476, 486.

[6] L. c. 506.

[7] Hedwigia **30:** 148.

Martinique; also *S. Wrightii* Carl Müller, 1887, is now (1911) included under the same species as a variety. This last species was based upon the specimen (no. 1) in Wright's Musci cubenses named by Sullivant *S. cymbifolium*, and its inclusion under *S. guadalupense* was already foreshadowed by C. Müller, who included with it specimens named *S. guadalupense* Schimp. from Guadeloupe.[1] It agrees very well with *S. erythrocalyx*, except that it is not so strongly pigmented, a feature frequent in Cuban specimens of this species. *S. Sintenisii* C. M., 1898, from Porto Rico is retained by Warnstorf,[2] but the type material in the herbarium of the New York Botanical Garden represents a rather robust specimen of *S. erythrocalyx*, as do also the specimens collected by Heller[3] (no. 1339) and by Underwood & Griggs[4] (no. 949) on the same island. *S. brevicaule* Warnstorf, 1900, from North Carolina is also retained.[5] This is quite characteristic *S. erythrocalyx*, so far as I can see from examination of the type from the United States National Herbarium. The same applies to *S. Harperi* Warnstorf, 1904, from Georgia, of which I have also seen type, and finally to *S. Earlei* Warnstorf, 1911, from Cuba and *S. Huntii* Warnstorf, 1911, from British Honduras, part of the type of the latter having been kindly sent me by Rev. D. Lillie of Scotland, from whose herbarium it was described. Type material of *S. Earlei* was obligingly furnished me by Mr. H. H. Bartlett. It was collected by Earle in Herradura, Cuba, and seems to me to agree satisfactorily with other specimens collected in the same locality by Baker (no. 4881) and by Mrs. Britton (no. 6650) as well as with that of Wright, already mentioned, and others from other Cuban localities, all of which I have felt obliged to refer to *S. erythrocalyx*. Baker's specimen bears a herbarium name, *S. cubense*, of Warnstorf, which its author seems to have forgotten.[6] Warnstorf describes for *S. Earlei* slightly papillose inner walls of the hyaline cells of the branch leaves where overlying the chlorophyll cells.[7] These papillæ are but slightly developed and very difficult to make out and to my mind go merely to show the close relationship of the South American forms with and without papillæ

To be Continued

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[1] Flora **70:** 411. 1887.

[2] L. c. 474. 1911.

[3] Warnstorf has corrupted the name to Steller and retained the phonetic spelling Vega Baha (for Baja), of the label.

[4] This last less robust specimen, also collected near Vega Baja, is placed by Warnstorf (p. 507) with *S. guadalupense*.

[5] L. c. 460. 1911.

[6] The specimen he now includes under *S. guadalupense* var. *Wrightii*.

[7] L. c. 449. 1911.